example, systems where average holding times are short have a higher ratio of business to residence lines and business calls are more likely to be made in the peak period. Since costs are driven principally by busy hour rather than total usage, this could account for the difference in results between the calls and minute equation. This problem could be avoided by using peak rather than (or in addition to) total usage as the key cost driver.

## COMPARISON WITH ENGINEERING RESULTS

Table 2 also contains estimates of costs derived from an engineering model. (These estimates were calculated from data submitted by New England Telephone for use in a Massachusetts DPUC hearing.) While the econometric estimates are broadly similar to those derived from engineering analyses, they generally suggest higher cost. Thus, the Massachusetts study suggested access costs ranging from $12.5 to $14 per line per month. By comparison, econometric data suggest costs of $20 to $30 per line per month. Engineering estimates are generally closer to the econometric values for usage. For local usage, engineering costs are 1.1 cents per minute for electromechanical and .2 cents for electronic switching. In both cases, these are at the bottom of, or slightly below, the range of econometric estimates.

For toll calls, the engineering estimates were 1.0 cents per minute at either end of the call. These estimates, which assume electronic switching, are at the low end of the range observed econometrically.

Although the econometric and engineering estimates are close for some outputs and some equations, there is a wide gap when all outputs are considered simultaneously. For example, when all outputs are priced at marginal cost, the econometric equation produces total revenues of $1.3 to 1.5 billion for the average company in the sample. By comparison, pricing at the engineering estimates of

marginal cost would yield revenues of $634 to $680 million, less than half as much. This reflects the wide gap between engineering and econometric assessments of access costs and the fact that econometric equations with low local usage costs tend to have high toll and access line costs.

Three factors may account for the difference between engineering and econometric estimates. First, the engineering estimates typically include no allowance for system-wide overhead costs which can account for as much as 30 percent of total cost. The econometric analysis implies that these overheads do vary with output and, consequently, need to be included in assessments of marginal costs. The principal effect of this inclusion is to increase marginal cost per access line.

Second, capital expenditures are quite "lumpy" and, hence, engineering estimates often exclude significant components of capital cost which, when viewed from a single central office, appear insensitive to output. For example, a typical digital switch has start-up costs of about $500,000 irrespective of the level of usage or number of lines and, in engineering studies, these costs are not viewed as part of marginal cost. But, where growth in lines or usage ultimately results in the exhaustion of switches, some of these costs are incremental in that added growth will advance the date at which a new switch must be added. If this is the case, startup costs will show up as part of incremental cost in the econometric analysis.

Third, in engineering studies, marginal costs are calculated based on the most recent technology--fiber optic transmission facilities, digital switching, and electronic multiplexing in meeting long loop demands. Although technological mix is also taken into account in our econometric study, the measures are much cruder and only take into account the difference between electronic and electromechanical

switching. With more sophisticated measures of technology, the econometric estimate would be expected to more closely match the engineering estimates.

With these factors, differences between the engineering and econometric estimates seem understandable. But these differences nevertheless raise some serious issues. Although the engineering estimates undoubtedly provide more precise estimates of costs for the components on which they are focussed, they may ignore important components of costs incurred at a system-wide level or incurred in a lumpy fashion. On the other hand, while the econometric estimates are broader in scope, they are vulnerable to errors in specifying functional form, describing technology and controlling for extraneous cost factors. Useful estimates of marginal cost may require some amalgam of these two approaches.

If valid, the econometric estimates also reduce the seriousness of a pricing problem which has been inherent in the engineering estimates. Because the engineering estimates of marginal cost have been so low, pricing at marginal cost does not begin to meet revenue requirements. Consequently, to achieve full recovery, prices must be set well above costs. While this can be done efficiently using some variant of Ramsey pricing, such pricing is complicated (requiring estimates of own and cross-price elasticities of demand) and is politically unattractive to regulators. They find arguments that toll prices should be set close to cost while line charges should be set way above costs unappealing, presumably because of the distributional consequences. Although, as we shall see below, pricing at econometric estimates of marginal cost also leads to a revenue shortfall, it is much smaller and, hence, the requisite disparities between price and cost are also smaller. Efficient prices would be similar for both the engineering and econometric cost estimates. Using the econometric estimates, access costs are set in the $25 to $30 per line range because these are the marginal costs. With the engineering,

similar charges would be efficient because revenues based on marginal cost will not cover costs and line demands are inelastic. But regulators may find it easier to justify high access on cost grounds than on grounds of demand inelasticity.

## MARGINAL AND AVERAGE COSTS

As with engineering studies, the results of this econometric analysis suggests that marginal cost is well below average cost. This is illustrated in Table 3. For the companies in this sample, average costs (as reported to the FCC) are $1.76 billion per year. But, assuming that incremental demands are met exclusively from electronic systems, pricing all outputs at the marginal cost would generate only $1.2 to 1.5 billion in revenues or 20 to 30 percent less. If the effects of digital and fiber optic equipment were taken into account, the disparity would be undoubtedly larger.

For the econometric analysis, this study provides an opportunity to assess the source of these differences. There are three possibilities:

1. Economies of scale
2. Revaluation of capital
3. Technological changes

Since the equations do not exhibit economies of scale, this is clearly not a factor. Differences in the measurement of capital costs also have little impact. Thus, the annual cost of capital used here for the average company was about $600 million. By comparison, nominal capital charges under current accounting treatment would be about $630 million or 5 percent more. Thus, capital revaluation accounts for only $30 million or a 2 percent difference between average and marginal cost. The small effect of capital revaluation may reflect a limitation of the revaluation methods used. While we have taken into account change in construction costs for capacity built in the past, we have not directly considered the effects of new technology on

the value of the existing capital stock. Where the development of new electronic equipment has reduced cost, this lowers the value of older electromechanical equipment. As described below, however, this effect is taken into account by the inclusion of percent electronic as a cost determinant.

Virtually all of the remaining difference is attributable to technological change. Thus, if incremental demands were met with the average mix of equipment used in the past, marginal costs would be about 20 percent greater than those forecast with an all-electronic system. Without technical change, this recovery based on marginal cost would yield revenues very close to average cost.

This result is very helpful in explaining marginal cost to regulators. Moreover, it clearly suggests that marginal costs below average costs is not an inevitable outcome of the cost function for this industry. Because, in the past, technological change has driven costs downward faster in telecommunications than elsewhere, marginal costs are below average costs; if in the future the historic trends in productivity slow, the reverse might well be the case.

## METHODOLOGICAL ISSUES

This study differs from previous cost function estimation work in telecommunications in several respects. Three main methodological differences emerge: the use of cross-section data, exclusion of input prices and choice of output measures. I discuss each of these in turn.

### A. Use of Cross-section Data

The use of cross section data constitutes the principal difference in methodology between this and previous company analyses. We have chosen a cross-section approach rather than a time series approach in order to get significant independent variations in output. Virtually all of the previous studies have used approximately 30 years of time series data for either the Bell System or Bell

Canada. As suggested earlier, these studies have not, generally, been able to obtain statistically significant effects on cost for more than one or two output measures.

The principal problem with using cross-section data is that costs observed for each company (particularly the costs of capital) are not necessarily those needed to meet demand today but reflect the mix of technology used to meet demand over the past 30 years. We deal with this problem by revaluing the capital stock in current day's dollars and by including the mix of technology as a cost determinant. This enables us to estimate marginal cost as a function of technological mix and thereby to reflect more closely costs incurred with current technology. Moreover, using pooled time-series cross-section data, we also directly evaluate the effect of changes in output on cost currently.

B. Exclusion of Factor Prices

We have also excluded factor prices from our analysis. Differences in capital costs and labor costs across companies therefore show up in the error term of our model. Factor prices have been included in most prior efforts because a principal object of those analyses was to determine the degree of factor substitutability in the production of telecommunications services for which factor prices are essential. (See, for example, Christensen, Cummings and Schoech (1983) or Evans and Heckman (1983, 1984).) In the present case, factor prices have been excluded because we have no direct interest in factor substitutability, because neither capital or labor rates vary very much within the sample, because obtaining valid measures of these prices would have been quite difficult, and because we had no reason to believe that factor prices were systematically correlated either with output or technology measures. Under these assumptions, the estimated parameters of the model are unbiased estimates of the true cost function evaluated at average factor prices.

C. Output Measures

Output measures used here are also different from those used in earlier studies. Kiss (1986) relates the history of various output measures employed in cost modelling of telecommunications. The first models employed Tornquist-weighted single-output measures. Multi-output functions have since appeared, but with one exception (Taylor and Yanez, 1987) none of these measures have included access lines. This is clearly insufficient for our purposes. Since the principal objective of this study is to evaluate marginal cost of specific outputs, a multi-output analyses was key. Specifically, we examine the effect on cost of a number of access lines and either number of minutes of local and toll calling or number of toll and local calls. These outputs data were obtained from Statistics of Communications Common Carriers, and from quarterly reports to the FCC on minutes of usage. Unlike earlier studies, which typically measured output by deflating changes in revenue by changes in price, we have measured physical outputs directly. This approach is dictated by the data within which there are sharp variations in output prices.

D. Some Other Limitations

Some of the limitations of this study are inherent in the available data. The cost estimation observed here involves an analysis of data for 39 local exchange companies observed over a four year period--1984 to 1987. (Where calls data were used, we had data only on 37 companies). Since the annual observations are not totally independent (there is substantial autocorrelation in the errors), this constitutes a rather limited sample upon which to derive cost estimates. More reliable estimates would require more data.

Second, the available data contain only limited information on the technological mix of existing capital investment. The only technology variable available was the percentage of lines served by electronic equipment. While this

division is useful, to estimate current marginal costs we would have to identify the effect of digital switching equipment and fiber optic interoffice equipment on cost. Without these more detailed technological descriptions, the analysis here should be regarded only as illustrative since it cannot describe the incremental cost of delivering telephone service today. This should be regarded as a limitation on the model used here but not on the technique itself If the results observed here seem generally plausible, it might be worth refining the measures of technology.

Third, limitations of time and resources required overly simplistic approaches to estimating the value of the capital stock. We examined capital investment only in aggregate and did not, therefore, take into account differences in price escalation or depreciation by equipment type. Moreover, much of the change in value for the historic capital stock reflects substitution of new electronic for old electromechanical equipment. Except where the effect of these technological changes is reflected in changes in the aggregate cost index, the effect of such changes on the value of the capital stock has not been taken into account.

Finally, in using cross-section data to measure the effect of outputs and technology on cost, we are assuming that other cost determinants not included in the regression are uncorrelated with the measures of output and technology which are included. In general, this assumption seems reasonable, except that one might plausibly expect population density to be related to phone costs (inversely) and to output (positively). However, efforts to include density variables in the model indicated no significant relationship to cost.

## CONCLUSION

In general, this exercise in the econometric assessment of marginal cost leaves us optimistic about this approach. The econometric analysis accounts for much of the differences in cost among companies and provides generally plausible

estimates of marginal cost. Moreover, when the sources of difference are understood, the results are not necessarily inconsistent with engineering analysis. In fact, if the interpretation posed here is valid, econometric analyses may be a necessary supplement to engineering assessments in order to cover costs incurred at a system-wide level and costs incurred in large lumps. This study also provides useful evidence in the gains from system modernization, an issue often debated before state public utility commissions.

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TABLE 1

## COST REGRESSIONS FOR TELEPHONE COMPANIES

| | Regression Based on Calls | | | Regression Based on Minutes | | |
|---|---|---|---|---|---|---|
| | | Coefficient (t-Statistic) | | | Coefficient (t-Statistic) | |
| | Variable Means (Millions) (1) | Ordinary Least Squares (1984 Dollars) (2) | Random Effects (1984 Dollars) (3) | Variable Means (Millions) (4) | Ordinary Least Squares (1984 Dollars) (5) | Random Effects (1984 Dollars) (6) |
| Total Cost | 1,621 | - | | 1,571 | - | - |
| Constant | 1.0 | $-33.72<br>(1.18) | $-62.60<br>(2.33) | 1.0 | $-90.32<br>(2.49) | $-83.85<br>(2.30) |
| Access Lines | 2.8718 | 349.44<br>(4.91) | 459.60<br>(8.00) | 2.7712 | 496.99<br>(4.10) | 458.88<br>(5.96) |
| Local Calls | 9,394 | 0.1668<br>(9.29) | 0.1197<br>(10.90) | 40,055 | 0.0214<br>(4.56) | 0.0231<br>(8.24) |
| Toll Calls | 1,437 | 0.2389<br>(6.69) | 0.1238<br>(4.36) | 11,513 | 0.0392<br>(3.16) | 0.0324<br>(4.84) |
| Electronic Calls | 7,660 | -0.1275<br>(9.92) | -0.0628<br>(14.17) | 36,244 | -0.0192<br>(6.14) | -0.0135<br>(10.912) |
| Bell Lines | 2.6060 | -108.22<br>(3.21) | -174.87<br>(5.68) | 2.4723 | -133.44<br>(2.78) | -171.79<br>(3.83) |
| Number of Observations | | 37 | 142 | | 39 | 142 |
| Adjusted R-Squared | | 0.997 | | | 0.994 | |
| Standard Error | | 0.100 | | | 0.137 | |

TABLE 2

## MARGINAL COSTS

| | Econometric Estimation | | | | |
|---|---|---|---|---|---|
| | Calls Regression | | Minutes Regression | | |
| | Ordinary Least Squares (1) | Random Effects (2) | Ordinary Least Squares (3) | Random Effects (4) | Engineering[1] Estimate (5) |
| Lines Per Month | $20.94 | $25.08 | $31.49 | $25.47 | $12.5-$14 |
| Local Minutes: (Cents/minute) | | | | | |
| Electromechanical | 3.8 | 2.7 | 2.1 | 2.3 | 1.1 |
| Electronic | 0.9 | 1.3 | 0.2 | 1.0 | 0.2 |
| Toll Minutes: (Cents/minute) | | | | | |
| Electromechanical | 2.9 | 1.5 | 3.9 | 3.2 | |
| Electronic | 1.4 | 0.7 | 2.0 | 1.9 | 1.0 |

**Sources and Notes**

[1] For usage, these estimates reflect costs per switched minute. Interoffice calls are measured both at the originating and terminating office (i.e., a 4.0 minute interoffice call generates 8.0 switched minutes) and the measure includes minutes generated by uncompleted calls.

TABLE 3

## CALCULATION OF REVENUES AT MARGINAL COST AND AVERAGE COST

| | Ordinary Least Squares | Random Effects | Percentage of Total Revenues: Ordinary Least Squares | Percentage of Total Revenues: Random Effects |
|---|---|---|---|---|
| | (1984 $Millions) | | | |
| | (1) | (2) | (3) | (4) |
| **Total Revenues** | $1,761 | $1,822 | 100.0% | 100.0% |
| **Total Revenues at Marginal Cost Using:** | | | | |
| Calls Regression | | | | |
| Average Technology | 1,655 | 1,686 | 94.0 | 92.5 |
| Electronic Technology | 1,251 | 1,487 | 71.0 | 81.6 |
| Minutes Regression | | | | |
| Average Technology | 1,661 | 1,658 | 94.3 | 91.0 |
| Electronic Technology | 1,367 | 1,451 | 77.6 | 79.7 |

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TESTIMONY

OF

PAULA L. BROWN

Q. Please state you name and business address.

A. My name is Paula L. Brown. My office is located at 125 High Street, Boston, Massachusetts. I am currently in the position of Managing Director for NYNEX Corporation.

Q. Please describe your educational and professional background.

A. I received my Bachelor of Arts degree in Political Science from Vassar College, Poughkeepsie, New York, in 1970. I was employed by New England Telephone ("NET" or "NYNEX") in June of 1970 and was assigned to the Commercial Department. I held various positions in that department until 1980 when I was assigned to the Marketing Department. I was responsible in that assignment for operations associated with sales channels. In 1983, I transferred to the Revenue Matters Department where I held various positions associated with pricing access services. From 1984 through 1986, I was assigned to the NYNEX Service Company where I worked on federal access services issues. In 1987, I returned to New England Telephone and assumed responsibility for the planning, pricing and implementation activities for state access services. In 1989, I was assigned as Director of Regulatory

Issues for Massachusetts and Rhode Island. I am currently responsible for the pricing of services in Massachusetts.

I have previously testified before the Department, the Maine Public Utilities Commission, the Rhode Island Public Utility Commission and the Vermont Public Service Board on marketing and pricing matters. I have testified before the Department in D.P.U. 91-30, D.P.U. 92-100 and D.P.U. 93-125, which were the transitional filings made by NET in accordance with the Department's Order in D.P.U. 89-300.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe a framework for the pricing of the unbundled network elements and other interconnection arrangements which Mr. Calabro describes in his testimony. These arrangements will accommodate the entry of Competitive Local Exchange Carriers (CLECs) desiring to compete for local exchange service in Massachusetts. My testimony will show how the pricing framework relates to the Department's principles as established in D.P.U. 1731, D.P.U. 86-33, D.P.U. 89-300, and D.P.U. 94-50. I will also address universal service funding and the resale of NYNEX's unlimited services. These latter subjects are issues which were identified in the Department's Notice of January 6, 1995, that opened this docket.

INTRODUCTION

Q. Please describe the process through which the Department has considered the appropriate pricing of NYNEX's offerings.

A. Soon after the divestiture of the Regional Holding Companies from AT&T, the Department established a framework for competition in the Commonwealth of Massachusetts in D.P.U. 1731 (1985) and further detailed the framework in D.P.U. 86-33 and in D.P.U. 89-300. In these Orders and in subsequent transition filings, the Department laid the foundation for the introduction of competition in the telecommunications industry in Massachusetts. The Department considered the appropriate cost methods and analyses that should guide pricing decisions; adopted a process to transition prices to promote economic efficiency; and set in place a structure for moving toward its pricing goals. The Department's goal of establishing rates that promote economic efficiency was balanced with historic regulatory decisions and policies, such as universal service, earnings stability and the avoidance of rate shock.

Q. Can the introduction of competition for local exchange service be accommodated under the Department's pricing policies?

A. Yes. Competition for local exchange service is part of the continuum of change that commenced with the introduction of intraLATA competition on December 1, 1986, pursuant to the Department's Order in D.P.U. 1731. The Department's pricing

policies are based upon sound economic principles, fashioned through years of litigation, and should be used as the basis for decisions as competition continues to develop.

In this docket, the Department is considering the physical arrangements and terms that will govern the interconnection of competing exchange networks. First, the Department must address the types of services and operating arrangements the Company should reasonably be required to provide to the new entrants, and conversely, what may constitute unreasonable requirements on the Company. Mr. Calabro discusses these issues in his direct testimony. The Department must then decide how to apply its policies to determine reasonable prices for the interconnection arrangements. The pricing of interconnection arrangements should be consistent with the Department's principles of promoting economic efficiency while balancing its other regulatory goals.

Q. Please describe the framework that the Department has previously established regarding the pricing of services.

A. In its Order in D.P.U. 1731, the Department established six rate structure goals for the telecommunications industry. These goals are: efficiency fairness, earnings stability, simplicity, continuity and universal service. (Order pp. 19-24) Based upon these six goals the Department established a framework in subsequent proceedings, which balances these goals using four methods for assessing the reasonableness of

NYNEX's prices. The four methods are: 1) marginal costs as determined in the Company's Marginal Cost Study (MCS), 2) illustrative tariffs which show economically efficient prices, 3) comparison of prices for similar services, and 4) target rate levels. In addition, in its recent Order in D.P.U. 94-50, the Department established a two-part price floor for NYNEX's services. The Department included the price floor as part of the price cap plan in order to prevent cross-subsidization and anticompetitive pricing. Consistent with its previous decisions, the Department recognized that the price floor does not necessarily represent the price that should be set for any particular offering.

Q. Please explain how each of the pricing methods is used in assessing price.

A. The first method is marginal costs. The marginal costs are used to understand a minimum below which a price should not be established, absent a compelling public policy reason. In other words, marginal costs are the floor for pricing and the starting point for evaluating prices. As the Department indicated in its discussion of switched access charges in its order in D.P.U. 94-50 (p. 249), an economically efficient price is not necessarily equal to the marginal cost of the service because pricing at marginal costs will not permit the firm to recover its costs. Other analyses are, therefore, required to establish prices

Illustrative tariffs are the second consideration. In

its Order in D.P.U. 86-33C, the Department directed the Company to develop these tariffs which identified the most inelastic rate elements in a grouping of offerings. The Company submitted the first set of illustrative tariffs in D.P.U. 89-300 and has continued to produce three sets of these tariffs in subsequent transition filings. These tariffs produce illustrative rate levels for all tariffed rate elements if the Department's only goal was economic efficiency. Prices are established in the illustrative tariffs by pricing the more demand elastic elements at the marginal costs and residually pricing the most inelastic rate elements in the grouping of offerings.

A third consideration in pricing is a comparison of similar services. This comparison is used to understand the cross elasticities of the tariff offering being priced with alternatives available to customers. Services which are substitutable should be priced with the same level of contribution above marginal costs to ensure the most economically efficient consumption of service.

Finally, target rates, which are a product of the Department's findings in D.P.U.89-300, are considered. Target rates are rates which move prices toward more efficient levels. The target rates were developed to balance the Department's goal of economic efficiency with its other sometimes competing policy goals. Target rates have been established for existing rate elements whose prices reflect

historic rather than economically efficient pricing. Through a series of transition filings, the prices for these existing offerings have been moved to or toward the target rate levels.

Q. Please describe the application of the two-part pricing floor, which the Department has established in D.P.U. 94-50.

A. As part of its adoption of price cap regulation for NYNEX in D.P.U. 94-50, the Department established a two-part pricing floor for NYNEX's services. If the Company controls an essential input, the price floor for NYNEX's retail service will consist of the relevant wholesale rate plus NYNEX's marginal cost of related overhead. For other services, the price floor will be the marginal cost as reported in MCS VI (Order, p. 205-206). The pricing floor for services is to be determined in the first price cap filing. For purposes of applying the price floor rule, the definition of service may be arguable. In this testimony the term "service" is used generally as a tariff description rather than defining a service for a price floor.

PRICING OF NETWORK ELEMENTS

Q. In this filing the Company is asked to address the pricing of network elements. What are these elements and how are they different from the serving arrangements the Company currently provides?

A. NYNEX's tariffs provide services which accommodate the needs of end users, COCOTs, cellular and paging providers, resellers and interexchange carriers. With the advent of local exchange competition, a new type of carrier has entered the market. These local exchange carriers want to compete for local exchange service as well as other services. The principle network elements new exchange carriers desire from NYNEX are: 1) a facility, with voice grade capabilities, 2) terminating access for local calls, and 3) other arrangements such as access to Signalling System 7 (SS7), Directory Assistance and Directory Listings, interim number portability and access to 911 and E911.

Q. Could you please discuss the first network element.

A. The first network element is a local loop facility which is provisioned without dial tone and connects the end user to NYNEX's end office, terminating at the carrier premises in NYNEX's end office, i.e., a collocated cage. The loop facility is commonly called the "link". The link can be used by a CLEC to provide a channel or access for two way voice communications between the carrier's switch and the CLEC's end

user during the period when the competing carrier does not have facilities in place to the particular location. Mr. Calabro discusses in his testimony that NYNEX will provide these links when requested.

Q. Using the Department's framework, what analyses should be undertaken in determining a reasonable price for a link?

A. The first consideration in the pricing of the link would be a review of its marginal costs. The marginal cost of the link was developed using the dial-tone line costs developed in D.P.U. 86-33 as the starting point. The MCS submitted in D.P.U. 86-33 included the cost of a residence dial-tone line ($13.06) and a business dial-tone line ($10.80). The Department determined that these costs did not need to be included in the transitional or illustrative tariff filings since the dial-tone line was an inelastic rate element and should be priced residually. Therefore, the Company did not conduct a dial-tone line cost study in future MCSs.

The link marginal cost is developed by adding the relevant portions of the dial-tone line cost to the cross wiring marginal costs that are unique to a link. The resultant cost is $9.84 for a residence link and $7.68 for a business link. The marginal cost development is displayed on Attachment 1 to my testimony.

Q. Please describe the results of the second consideration, the illustrative tariffs.

A. As previously stated, the illustrative tariffs show what

prices would be if the Department's only goal were economic efficiency. In these tariffs, the most inelastic rate elements are identified. Prices for all other rate elements are set at marginal cost and inelastic rate elements are residually priced. The illustrative tariffs show average prices throughout the state and do not address market segmentation.

Although the demand for the link may vary by market segment, in the context of the illustrative tariffs which consider rate elements on a statewide average basis, the link would be categorized like other loops as one of the most inelastic charges. The link was not envisioned in the original illustrative tariffs, but is similar to the dial-tone line or to a Private Line intraoffice channel. Both the dial-tone line and the Private Line intraoffice channel are inelastic rate elements in the illustrative tariffs and, therefore, are residually priced. The range of these rates can be used as a surrogate for what the residually priced link charge might be.

Depending upon the configuration, the illustrative tariffs show a range of charges between $18.07 and $24.66 for the Residence dial-tone line and $11.82 and $84.90 for Private Line intraoffice channels. For the Business dial-tone line the charges range from $17.66 to $30.92, and the range of charges for business Private Line intraoffice channels is from $61.84 to $85.96. Using the illustrative tariff approach, a

range of prices for the link would be somewhere between $11.62 to $85.96. In the past the Department has found the illustrative tariff Scenario H to be most instructive. The prices in all three scenarios are shown below.

| | Scenario G | Scenario H | Scenario J |
|---|---|---|---|
| Dial-tone Line | | | |
| Residence | $24.66 | $24.62 | $18.07 |
| Business | $26.90 | $30.92 | $17.66 |
| Local Channel | | | |
| Residence | $84.90 | $61.84 | $11.82 |
| Business | $84.90 | $61.84 | $85.96 |

I will make one additional observation. The $11.82 to $85.96 range of rates is an average price. If we were to maximize economic efficiency this price would be deaveraged in response to the market segmentation of the new entrants.

Q. What services should be considered as a similar service when pricing the link?

A. As previously described, the link is a facility that extends from the end user's location to a collocator's premises or the cage. It is similar to an intraoffice private line. The monthly charge for a Private Line is $36.46, and it has a marginal cost of $11.18. Therefore, the contribution from a private line is $25.28.

Other services which should be considered in this analysis are Residence and Business exchange service, because the link replaces these services. The average revenue used for this analysis is $31.37 for a residence customer. The

average marginal cost associated with the services for a residence customer is $19.54, and the average contribution is $11.83. For a business customer, the average revenue is $42.06. The average business marginal cost is $20.68 resulting in an average contribution of $21.38. The calculations for this analysis are displayed in Attachment 2.

Q. Is there any other way of looking at a price level for a link?

A. Yes. Up to this point I have considered the pricing framework adopted by the Department and used by NYNEX to establish prices for services. Another approach for addressing the price of a link is to attribute an equal proportion of contribution to all charges. Although the Company does not advocate this methodology, an equal distribution of contribution is an alternative approach. The result of this methodology is a dial-tone line charge of $22.29 for residence and $19.01 for business.

Q. Based upon these considerations, what would be a reasonable charge for a link?

A. Monthly charges of $21.00 for a residence link and $29.00 for a business link would be reasonable. These charges recover the marginal cost of the link, and provide a level of contribution of approximately $11.00 and $21.00 for a residence and business link respectively. The level of contribution is less than that received from a Private Line intraoffice channel. The level of contribution is also